119d.

INSTRUCTION MANUAL

F1004

FOR

TYPE IFD-500B

IF DEMODULATOR

COMMUNICATION ELECTRONICS, INC.

6006 EXECUTIVE BOULEVARD ROCKVILLE, MARYLAND, 20852

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FOR
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WARNING

This equipment employs voltages which are dangerous and may be fatal if contacted. Extreme caution should be exercised in working with the equipment with any of the protective covers removed.

TABLE OF CONTENTS

Paragraph		Page
	SECTION I GENERAL DESCRIPTION	
1.1	Electrical Description	1-1
1.2	Mechanical Description	1-1
	SECTION II CIRCUIT DESCRIPTION	
2.1	General	2-1
2.2	Functional Analysis	2-1
2.3	IF Amplifiers	2-2
2.4	AM Detector	2-2
2.5	Video Amplifier (A1)	2-2
2.6	Limiter Stages	2-2
2.7	FM Discriminator	2-2
2.8	Video Amplifier (A2)	2-3
2.9	Video Amplifier (A3)	2-3
2.10	AGC Amplifier	2-3
2.11	Mode Selector Switch	2-3
2.12	AGC Selector Switch	2-3
2.13	Video Bandwidth Switch	2-3
2.14	Beat Frequency Oscillator	2-3
	SECTION III INSTALLATION AND OPERATION	
3.1	Installation	3-1
3.2	Operation	3-1
	SECTION IV MAINTENANCE	
4.1	General	4-1
4.2	Troubleshooting	4-1
4.3	Alignment Instructions	4-1
4.4	Alignment Procedure	4-2
	SECTION V REPLACEMENT PARTS LIST	
5.1	Unit Numbering Method	5-1
5.2	Reference Designation Prefix	5-1
5.3	List of Manufacturers	5-1
5.4	Parts List	5-2

LIST OF ILLUSTRATIONS

Illustration		Page
Table 1-1	Type IFD-500B IF Demodulator, Specifications	v
Table 1-2	Type IFD-500B IF Demodulator, Transistor Complement	1-2
Table 4-1	Type IFD-500B IF Demodulator, Transistor Element Voltages	4-5
Table 4-2	Type IFD-500B IF Demodulator, Troubleshooting Chart	4-6
Figure 1-1	Type IFD-500B IF Demodulator, Front View	1-0
Figure 2-1	Type IFD-500B IF Demodulator, Functional Block Diagram	2-0
Figure 4-1	Equipment Setup, Calibration and BFO Alignment	4-2
Figure 4-2	Equipment Setup, IF Alignment	4-3
Figure 4-3	Typical Response Curve, IF Alignment	4-3
Figure 4-4	Typical Response Curve, Discriminator Alignment	4-3
Figure 5-1	Type IFD-500B IF Demodulator, Left-Side View	5-4
Figure 5-2	Type IFD-500B IF Demodulator, Right-Side View	5-6
Figure 5-3	Type IFD-500B IF Demodulator, Right-Side View	5-8
Figure 5-4	Type IFD-500B IF Demodulator, Right-Side View	5-10
Figure 5-5	BFO Assembly, Component Locations	5-11
Figure 5-6	Part 10949 Video Amplifier, Component Locations	5-12
Figure 5-7	Part 10383 AGC Amplifier, Component Locations	5-13
Figure 5-8	Part 10447 FM Demodulator, Component Locations	5-15
Figure 5-9	Part 10447 FM Demodulator, Component Locations	5-16
Figure 6-1	Type IFD-500B IF Demodulator, Schematic Diagram	6-3

Table 1-1. Type IFD-500B IF Demodulator, Specifications

Types of Reception	AM, FM, and CW
Center Frequency	21.4 mc
Dynamic Range	From noise up to 100 mv using AGC or manual gain control.
Bandwidth	500 kc ±50 kc
Distortion	AM: 5%, maximum, when modulated 30% at 1 kc rate FM: 5%, maximum, when modulated at 1 kc with 100 kc deviation
Spurious Response	Response falls off smoothly to 60 db down without abrupt discontinuities or amplitude inversions.
Input Impedance	50 ohms; VSWR 1.5 to 1, maximum
Types of Gain Control	Normal (AGC), tracking or manual
Normal Gain Control	Internal AGC circuit maintains output level within 3 db over an input signal level range from 312 μv to 0.1 volt. The AGC will respond to signal variations up to 3 cycles and roll off at approximately 12 db per octave. The AGC will hold the second detector output level to approximately 1 vdc on CW signals.
Tracking Gain Control	Module gain controlled by an external high performance pulse-type AGC.
Manual Gain Control	A manual gain control is provided which will vary the gain from maximum to 60-db below maximum.
Stability with Normal (AGC) Gain Control	The center frequency will not change more than ±10% or the bandwidth by more than ±5% over the AGC range.
AGC Voltage Gain	Approximately 30 db
FM Output Stability	Output varies less than 6 db for an input signal level change of 60 db.
Beat Frequency Oscillator	Internal 21.4 mc BFO; adjustable ±10 kc from demodulator main chassis. The BFO is stable to 100 cycles per minute at a constant temperature.
Video Output Bandwidth	30 kc, 100 kc, or 250 kc selectable by front panel switch
Video Amplifier	Video amplifier will drive a 93-ohm load up to the maximum level of the video (AM or FM)
Pre-detection Output	A 21.4 mc pre-detection output will provide 10 mv, minimum. This output will exhibit all AGC characteristics and will work into a 50-ohm load.
Shape Factor (60 to 6 db)	5 to 1
Ripple Across Pass Band	2 db, maximum
Input Power	+12 vdc at 64 ma, maximum, and -12 vdc at 35 ma, maximum
Size	4.5-inches high, 5.25-inches wide, and 13-inches deep
Weight	2.75-lbs., approximately

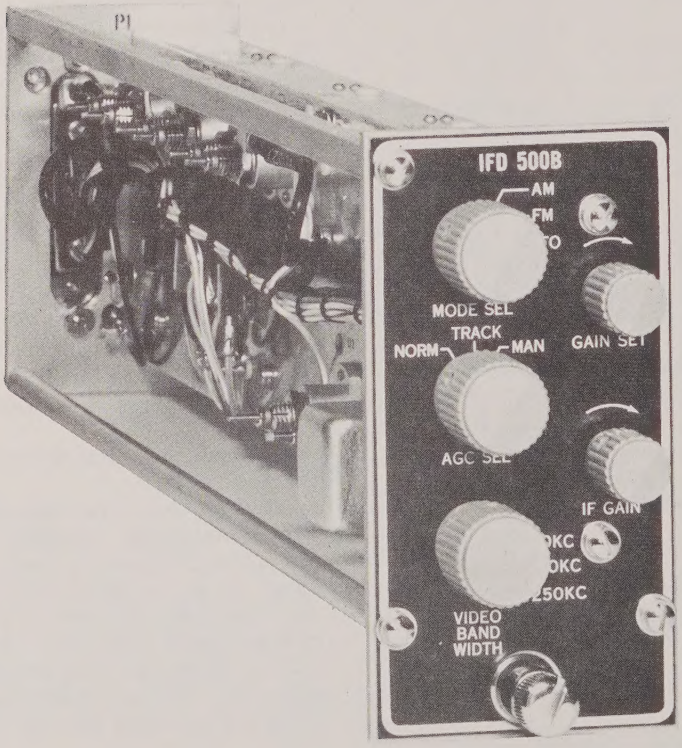

Figure 1-1. Type IFD-500B IF Demodulator, Front View

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL DESCRIPTION

The type IFD-500B IF Demodulator is designed for the reception of AM, FM, and CW signals from a 21.4-mc IF signal input. This unit plugs-in the type DM-4B Demodulator main chassis which furnishes the 21.4 mc input signal. The bandwidth of the IFD-500B is 500 kc. The bandwidth of the video output signal can be set to 30 kc, 100 kc, or 250 kc by a front-panel switch. Operating voltages, signal inputs, and signal outputs are connected to the unit from the DM-4B Demodulator module. Three signal inputs are normally furnished from the DM-4B to the IFD-500B: a 21.4 mc IF input; a BFO tuning voltage input; and a tracking AGC voltage input. The IFD-500B provides five signal outputs to the DM-4B: a tuning meter voltage output; a video output; a 21.4 mc pre-detection output; an AGC monitor output; and a tracking video output. Solid state components are used exclusively in the design to provide high reliability and low power consumption. Pertinent specifications for the IFD-500B are presented in Table 1-1; the transistor complement is presented in Table 1-2.

1.2 MECHANICAL DESCRIPTION

As shown in Figure 1-1, the front panel of the IFD-500B mounts the MODE SEL switch, AGC SEL switch, VIDEO BANDWIDTH switch, the GAIN SET, and IF GAIN controls.

1.2.1 All inputs and outputs for the module are accomplished through the 15-pin Cannon connector on the rear apron of the module.

1.2.2 The main chassis and front panel are constructed of aluminum. The front panel is grey with an overlaid black-anodized etched plate. The IF chassis is constructed of brass, which is silver-plated and gold-flashed to prevent tarnishing. Located within the chassis are five etched printed circuit boards which contain the components for three video amplifiers, an AGC amplifier, and the FM limiter/discriminator.

Table 1-2. Type IFD-500B IF Demodulator, Transistor Complement

Ref. Desig.	Type	Function
	Main Chassis	
Q1	2N2708	IF Amplifier
Q2	2N2708	IF Amplifier
Q3	2N2708	IF Amplifier
Q4	2N706	BFO
Q5	2N706	21.4-mc Amplifier
	Video Amplifiers	
A1-A3Q1	2N697	Emitter Follower
A1-A3Q2	2N706	Emitter Follower
A1-A3Q3	2N3251	Emitter Follower
	AGC Amplifier	
A4Q1	2N697	DC Amplifier
A4Q2	2N697	Regulator
	Limiter/Discriminator	
A5Q1	2N706	Symmetrical Limiter
A5Q2	2N706	Symmetrical Limiter
A5Q3	2N706	Symmetrical Limiter
A5Q4	2N706	Symmetrical Limiter

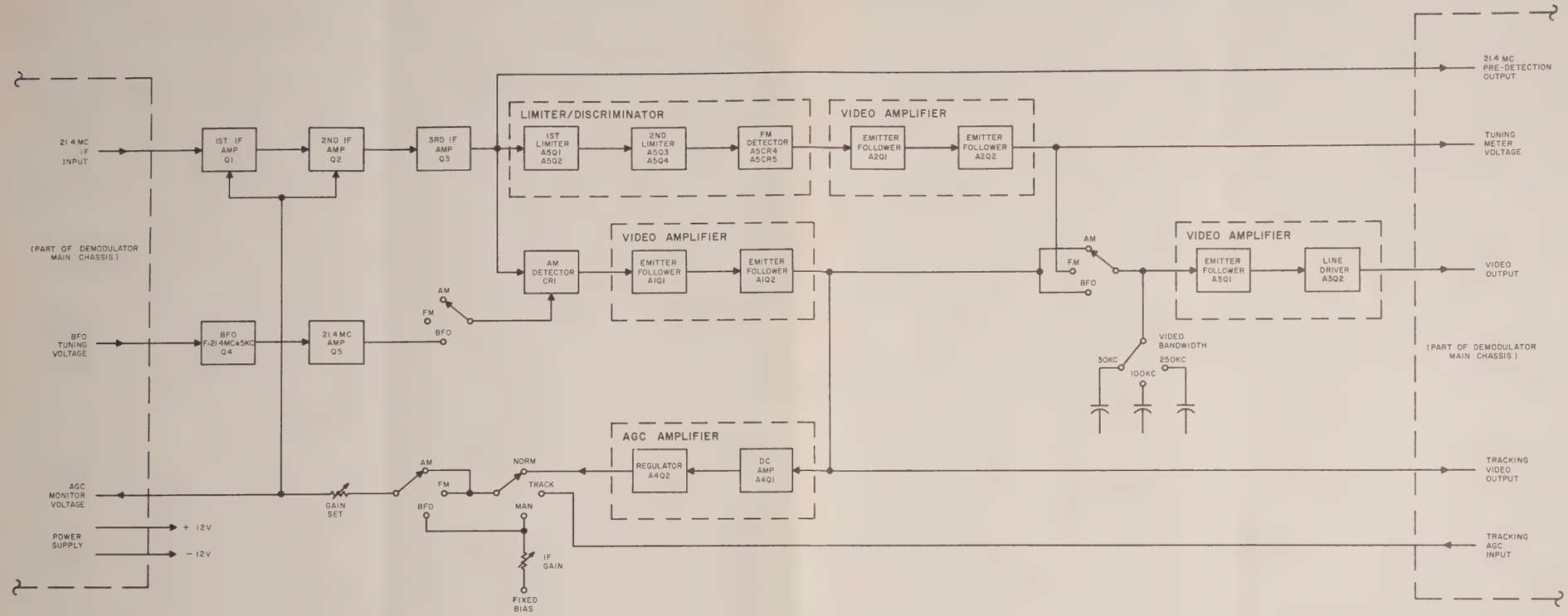

Figure 2-1. Type IFD-500B IF Demodulator, Functional Block Diagram

SECTION II

CIRCUIT DESCRIPTION

2.1 GENERAL

A circuit description of the type IFD-500B IF Demodulator is given in the following paragraphs using the block diagram, Figure 2-1, and the over-all schematic diagram, Figure 6-1. Note that the unit numbering system is used for the electrical components, which means that parts on subassemblies carry a prefix before the usual class letter and number of the item (such as A1C1 and A2Q1). These prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

2.2 FUNCTIONAL ANALYSIS

The type IFD-500B IF Demodulator is one of several plug-in units which are used in conjunction with the DM-4B Demodulator main chassis. All of the operating voltages, signal inputs and outputs are coupled through a connector located on the rear apron of the module.

2.2.1 The 21.4-mc IF signal enters the unit from the DM-4B Demodulator main chassis and is applied to the first IF amplifier stage, Q1. The output of Q1 receives additional amplification in the second and third IF amplifiers, Q2 and Q3. Interstage coupling is through double-tuned, over-coupled circuits. These tuned circuits provide a bandwidth of 500 kc. The 21.4-mc output from the third IF amplifier is applied, simultaneously, to the AM detector, 21.4-mc pre-detection output, and FM limiters.

2.2.2 Two symmetrical limiter stages (A5Q1, A5Q2 and A5Q3, A5Q4) remove amplitude variations from the signal. The output of the second limiter is demodulated by a Foster-Seeley discriminator which contains diodes A5CR4 and A5CR5. The FM video signal from the discriminator is applied to one of three video amplifiers contained within the IFD-500B. This video amplifier consists of an emitter follower, A2Q1, which drives a complementary-symmetry emitter follower, A2Q2 and A2Q3. The FM video signal from the emitter follower is connected to the FM position of the mode selector switch, and also to the tuning meter voltage output.

2.2.3 The AM video signal output from the AM detector, CR3, is applied through emitter follower stage, A1Q1, to a complementary-symmetry emitter follower, A1Q2 and A1Q3, located on a second video amplifier assembly. The output of A1Q2 and A1Q3 is simultaneously connected to the AGC amplifier, the AM and BFO positions on the mode selector switch, and to the tracking video output. In a certain operating mode, the DM-4B Demodulator main chassis, in conjunction with another plug-in module, converts this tracking video signal to a dc voltage which re-enters the IFD-500B as the tracking AGC input.

2.2.4 In the AGC amplifier assembly, the AM video signal is applied to a dc amplifier stage, A4Q1. The voltage output of A4Q1 is applied to the AGC regulator stage, A4Q2. If the mode selector switch is in either the AM or FM positions and the AGC selector is set to NORM, then the output of A4Q2 is used to control the gain of the first and second IF amplifiers, Q1 and Q2.

2.2.5 Three gain control modes are possible during AM or FM reception: normal (NORM), tracking (TRACK), and manual (MAN). In any of these modes, the gain control voltage is applied to the base circuits of Q1 and Q4. Also, in any of these three gain control modes, the GAIN SET control provides additional gain control by varying the resistance in the emitter circuits of Q1 and Q2. In the normal mode, the AGC voltage is derived from the AM detector output and is applied through the AGC amplifier. In the tracking mode, the gain control voltage is provided by the DM-4B Demodulator main chassis and enters the IFD-500B as the tracking AGC input. In the manual mode, the gain of the IFD-500B is controlled by a voltage derived from the IF GAIN potentiometer. During CW reception (BFO position) only manual gain control is possible. The gain control voltage which is applied to stages Q1 and Q2 is also connected to the DM-4B Demodulator main chassis as the AGC monitor voltage.

2.2.6 The BFO (beat frequency oscillator) is activated when the mode selector switch is placed in the BFO position. The 21.4-mc output of the BFO-doubler stage, Q4 is amplified by Q5 and applied to the AM detector. The pitch of the CW audio signal produced can be varied by means of a control located on the DM-4B Demodulator main chassis.

This control furnishes a variable dc voltage (BFO tuning voltage) to the IFD-500B which can shift the frequency of the BFO stage ±5 kc from the normal 21.4-mc output.

2.2.7 The FM video signal appears at the FM position on one of the mode selector switch sections. The AM video signal appears at the AM and BFO positions. Depending on the switch setting, either the FM or AM video signal is connected from the arm of this switch section to the input of the third video amplifier assembly. This video amplifier contains an emitter follower (A3Q1) and a line driver (A3Q2, A3Q3). The video output from the line driver is connected to the DM-4B Demodulator main chassis. The video bandwidth switch, connected at the input of this video amplifier, sets the bandwidth of the video output at 30 kc, 100 kc, or 250 kc.

2.3 IF AMPLIFIERS

The 21.4-mc IF input signal is connected through J1 and coupled through C49 to the base of Q1, the first of three IF amplifier stages. Resistor R1 terminates the input. Interstage coupling is through double-tuned, over-coupled circuits which establish an over-all bandwidth of 500 kc. Neutralization of the three IF amplifier stages is accomplished by feedback through capacitors C2, C11, and C19 respectively. The output of the third IF amplifier provides inputs to the AM detector, symmetrical limiters and 21.4-mc pre-detection output.

2.4 AM DETECTOR

The AM detector, CR3, is a series diode detector operating on the positive excursions of the input signal. The output load resistor for the detector is R17. The AM detector output is connected to video amplifier (A1). Test point TP1 is provided to monitor the AM detector output.

2.5 VIDEO AMPLIFIER (A1)

The AM detector output is applied to the emitter follower A1Q1. The output of A1Q1 is applied to the base of A1Q3 and simultaneously to the base of A1Q2 through diodes A1CR1 and A1CR2. Transistors A1Q2 and A1Q3 form a complementary symmetry emitter follower which operates essentially the same as a push-pull class B amplifier. Silicon diodes A1CR1 and A1CR2 serve a dual function. First, they off-set the dc bias level at the bases of A1Q2 and A1Q3 to compensate for their base-emitter junction voltage drops. Secondly, these diodes provide for stabilization with temperature changes. This is possible because the transistors and diodes are made of the same material, and therefore exhibit the same voltage-vs-temperature characteristics. Resistors A1R4 and A1R5 in the emitters of A1Q2 and A1Q3 primarily prevent thermal runaway, but also add to the temperature compensation of the stage. The video amplifier output is applied to the AGC amplifier, tracking AGC output, and a section of the MODE SEL switch.

2.6 LIMITER STAGES

The 21.4-mc signal from the capacitive voltage divider at the output of the third IF amplifier is applied to the first symmetrical limiter stage (A5Q1, A5Q2). With no input signal, A5Q1 and A5Q2 are conducting approximately equal currents through the common emitter resistor, A5R3. When an input signal is applied, positive excursions at the base of A5Q1 are reflected through its base-emitter junction to the common emitter junction. This reduces the bias level on A5Q2 and if the input signal is of sufficient amplitude, this stage will cut off. Negative excursions of the input signal decrease the bias level on A5Q1, causing a reduction of current through this transistor. This results in an increase of conduction through A5Q2 causing it to go into saturation. Transistor A5Q2 can therefore operate between cut-off and saturation, effectively eliminating amplitude variations of the incoming signal. Diodes A5CR1, A5CR2 and A5CR3 clip extremely high amplitude signals to prevent these signals from causing damage to A5Q1 and A5Q2. The second limiter stage (A5Q3, A5Q4) operates essentially the same as the first limiter. The output from A5Q4 is coupled to the FM discriminator.

2.7 FM DISCRIMINATOR

The signal from the second limiter stage is coupled through capacitor A5C5 to a parallel resonant circuit tuned to 21.4 mc. This circuit consists of variable inductor A5L3 and the combination of capacitors A5C6 and A5C8 (the primary of transformer T1 offers very low reactance at 21.4 mc). This parallel resonant circuit is coupled into the discriminator through capacitor A5C7 and the transformer action of T1. The discriminator is a

Foster-Seeley type which uses capacitive center-tapping of the secondary circuit to obtain a high degree of balance unaffected by coil characteristics or tuning slug position. The FM video from the discriminator is direct-coupled to video amplifier (A2). Test point TP4 is provided to monitor the demodulated output.

2.8 VIDEO AMPLIFIER (A2)

The demodulated signal from the FM discriminator is applied to the video amplifier (A2). Operation of this video amplifier is the same as video amplifier (A1) previously described in paragraph 2.5. The output from the video amplifier is connected to a section of the MODE SEL switch.

2.9 VIDEO AMPLIFIER (A3)

The input signal is applied through the MODE SEL switch from the video amplifier (A1) if the switch is in the AM or BFO modes, and from the video amplifier (A2) if the switch is in the FM mode. The video amplifier operation is essentially the same as video amplifier (A1) previously described in paragraph 2.5. The output is connected to the Video Output. Test point TP3 is provided to monitor this output.

2.10 AGC AMPLIFIER

The AGC amplifier provides gain control for the first two IF amplifier stages, Q1 and Q2, when the AGC SEL switch is in the NORM position and the MODE SEL is set to either AM or FM. The AGC amplifier receives its input from video amplifier (A1). Two modulation filters, one at the input (A4C1 and A4R1) and one at the output (C29 and R26) of the dc amplifier, A4Q1, permit this stage to amplify only the average changes in carrier level. Emitter follower A4Q2 provides isolation between the AGC amplifier, A4Q1, and the IF amplifier stages being gain controlled.

2.11 MODE SELECTOR SWITCH

The MODE SEL switch, S1, is a three-position, three-wafer switch which is used to select the mode of operation: AM, FM or BFO. Section S1D connects the output from video amplifier (A1) or video amplifier (A2), depending on the switch position, to the video amplifier (A3). Section S1B connects +12 volts to the beat frequency oscillator when in the BFO position, and -12 volts to the BFO when in the AM or FM positions. Section S1A operates in conjunction with the AGC SEL switch to establish the gain control mode. In addition, the AGC monitor and signal strength meter outputs are taken from the wiper arm of section S1A.

2.12 AGC SELECTOR SWITCH

The AGC SEL switch, S2, is a three-position switch permitting front panel control of the type of gain control used for the first and second IF amplifiers. When the switch is in the NORM position, the internal AGC amplifier output is applied to the first and second IF amplifiers. In the TRACK position, a tracking AGC voltage is supplied from the DM-4B Demodulator main chassis to control the gain of these stages. With the switch in the MAN position, the IF GAIN control is used to vary the gain of the two stages.

2.13 VIDEO BANDWIDTH SWITCH

The VIDEO BANDWIDTH switch, S3, is connected to the input circuit to the video amplifier (A3). This switch is used to set the video output bandwidth at 30 kc, 100 kc or 250 kc by selecting capacitor C1, C53, or C51 which operates in conjunction with R34 and R41 to form a low-pass filter.

2.14 BEAT FREQUENCY OSCILLATOR

The BFO is used to produce an audio beat note when receiving CW signals. It operates only when the MODE SEL switch is in the BFO position. This applies +12 volts to Q4 and Q5. Transistor Q4 operates as a Colpitts oscillator and frequency doubler. The base circuit resonates at approximately 10.7 mc and the collector circuit is tuned to 21.4 mc. The 21.4-mc BFO signal is applied to the emitter of amplifier stage Q5. From the single-tuned collector circuit of Q5, the signal is coupled through C40 to the AM detector. The pitch of the beat note produced can be varied by the BFO tuning control on the DM-4B front panel. This control varies the dc voltage

across the voltage-variable capacitor CR2. A voltage-variable capacitor is a solid-state device whose capacitance varies as a function of the voltage across its terminals. Since CR2 and series capacitor C32 provide a capacitance which shunts the tuned circuit in the base of Q4, changing the capacitance of CR2 changes the oscillator frequency. Positioning the MODE SEL switch to any other setting applies -12 volts to the BFO. This turns off the BFO and foward biases CR3. The low impedance of CR3 in the conducting state prevents the tuned circuit (L12 and C39) from affecting the AM response.

SECTION III

INSTALLATION AND OPERATION

3.1 INSTALLATION

The type IFD-500B IF Demodulator is designed to operate in conjunction with the DM-4B Demodulator. This module will operate in any of the four DM-4B module positions. Approximate space requirements are: 4.5-inches high, 2.25-inches wide, and 13.5-inches projection into the DM-4B. Adequate ventilation should be provided for proper operation of the module and also to prevent unnecessary aging of components.

3.1.1 Inserting Module. - Place the module in any one of four positions in the DM-4B. The guide pins on the rear apron of the module will properly seat the receptacle on the rear of the module with the receptacle at the rear of the slot of the DM-4B into which the module is being placed.

3.1.2 Inputs/Outputs. - All signal inputs and outputs of the module are accomplished through the 15-pin connector on the rear apron of the module.

3.1.3 Operating Voltages. - The necessary operating voltages for the module are supplied by the DM-4B. The power/on-off switch is located on the DM-4B front panel.

3.2 OPERATION

The operating controls on the front panel of the module are described in the following paragraphs; these controls are shown in Figure 1-1.

3.2.1 AGC Selector. - The AGC SEL switch determines the type of gain used for the module; NORM, TRACK or MAN. The normal AGC is provided by circuitry within the module. The tracking AGC is supplied from the demodulator main chassis. The manual type of gain control is supplied by the IF GAIN potentiometer.

3.2.2 Mode Selector. - Set the MODE SEL switch to the AM, FM, or BFO (for CW reception) positions as desired before tuning. In the BFO position, the gain must be manually adjusted using the IF GAIN control.

3.2.3 Video Bandwidth. - The VIDEO BANDWIDTH switch allows the operator to select one of three video output bandwidths as marked on the panel.

3.2.4 Gain Set. - The GAIN SET potentiometer varies the gain of the first and second IF amplifiers by ±6 db.

3.2.5 IF Gain. - This control varies the amount of gain control voltage applied to the first and second IF amplifiers when the AGC SEL switch is in the MAN position and the MODE SEL switch is in the AM, FM, or BFO position.

SECTION IV

MAINTENANCE

4.1 GENERAL

The type IFD-500B IF Demodulator has been carefully designed so that it will operate for long periods of time with little more than routine maintenance. Should trouble occur, it is important that maintenance personnel be familiar with Section II in which the circuits are described. In addition, they should refer to Figures 5-1 through Figure 5-9 where the component locations are shown; to the schematic diagram, Figure 6-1; and to Table 4-1, the transistor pin socket voltages.

CAUTION

All maintenance work within this unit should be kept to a minimum and performed only by trained and experienced personnel. The placement of components and the dress of leads in the equipment have been carefully engineered to give optimum performance. In replacing any components, great care should be exercised to duplicate the exact physical layout of the original assembly.

4.2 TROUBLESHOOTING

Most troubles will be caused by failures of the transistors or diodes. The proper functioning of all these parts should be assured by either test or by replacement with parts known to be good before any further troubleshooting is carried out. After the above measure has been carried out, initial troubleshooting should be directed toward localizing the problem to a specific portion of the unit. One procedure which should be considered for localizing troubles is to feed in a signal at the input and then check the signals present at each test point. To this end, it is desirable that all maintenance personnel familiarize themselves with the alignment procedures, even if an alignment is not required, because those procedures include methods of checking performance which may help in analyzing the cause of the trouble. In addition, be certain that the power supply is functioning normally before any other circuit is suspected. Table 4-2 contains guides which may be useful in troubleshooting.

4.3 ALIGNMENT INSTRUCTIONS

The alignment procedures in this book are suitable for performance in the field when making periodic performance checks, or when making adjustments after replacing components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the work in that circuit. Those controls not mentioned in any one series of steps may be left in any position. The alignment of this unit should be performed only with suitable equipments by technicians thoroughly familiar with their use. If the limits and tolerances specified in the following steps cannot be obtained during a field alignment, a factory alignment is necessary. Allow several minutes for warm-up before beginning the work.

4.3.1 Use of Marker During Alignment. - A post-detection type of marker adder is recommended, and the alignment procedures in this book assume that one is to be used. However, if such a marker adder is not available, the marker generator output should be loosely coupled to the sweep generator output. This can be done by connecting the marker signal source to a turn or two of insulated wire wrapped around the sweep generator lead near the point of connection to the circuit under test, or by coupling to the sweep generator lead through a small capacitor. To insure that the addition of the marker is not affecting the response curve, disconnect the marker generator and observe that no change in the curve's shape or symmetry occurs.

4.3.2 Use of Oscilloscope During Alignment. - The vertical and horizontal amplifier inputs on the oscilloscope should be set in the dc coupled mode. The dc component of the signal on the vertical input should be cancelled out by applying an equal voltage to the unused vertical differential scope input, since the dc component sometimes makes

it impossible to center the signal vertically. Otherwise it will sometimes be necessary to use the ac coupled mode. A low-capacity shielded cable should be used to connect to the oscilloscope, and the shield should be grounded as closely as possible to the point to which the center conductor is connected.

4.3.3 Equipment Required. - The following equipments, or their equivalents, are required to perform the complete IFD-500B alignment:

(1) Sweep Generator, Telonic SM2000 with LH-2 Plug-in Head and internal 21.4 -mc marker
(2) Oscilloscope, Tektronix Type 503
(3) Signal Generator, Hewlett Packard 606A
(4) Frequency Counter, Computer Measurement Corp. 738A
(5) Demodulator, Communication Electronics DM-4B
(6) Test Cable, Communication Electronics Type EC-101B or one fabricated using one Cannon DBM-17W-2P Connector (with two DM53740-5001 inserts), and one Cannon DBM-17W-2S Connector (with two DM53742-5001 inserts).
(7) Assorted cables, connectors, and alignment tools.

4.4 ALIGNMENT PROCEDURE

The over-all alignment is given in the following paragraphs:

4.4.1 Initial Settings and Calibration. - Adjust controls as follows. After initial adjustment, do not change the position of any control unless instructed to do so.

(1) On the IFD-500B place the MODE SEL in AM position, AGC SEL in MAN position, VIDEO BANDWIDTH in 250 kc position, rotate GAIN SET control to maximum clockwise position.
(2) Using the frequency counter, calibrate the HP606A signal generator for an output of 21.400 ±.002 mc.
(3) Set signal generator output level at 250 μv.
(4) Connect equipment as shown in Figure 4-1.
(5) Adjust the IF GAIN control on the IFD-500B for 1.0 vdc output at TP1 as indicated by oscilloscope.

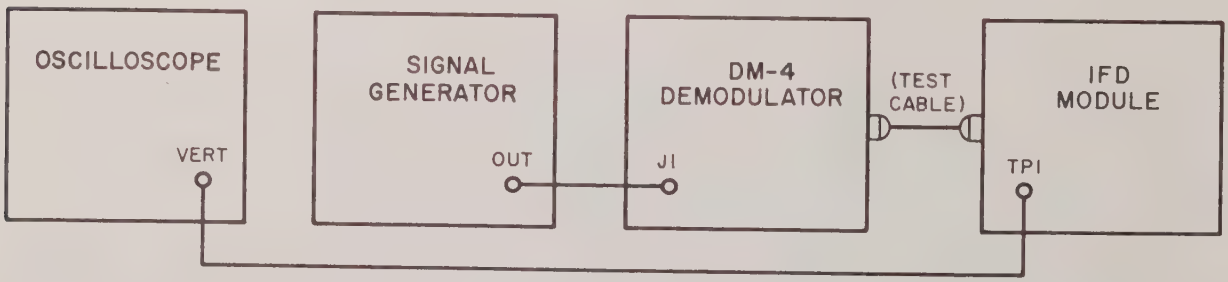

Figure 4-1. Equipment Setup, Calibration and BFO Alignment

4.4.2 IF Alignment. - Proceed as follows:

(1) Connect equipment as shown in Figure 4-2.
(2) Set sweep generator for 21.4-mc center frequency output. Turn the internal 21.4-mc marker on.

(3) Adjust sweep generator and oscilloscope controls until a response curve is displayed.
(4) Adjust sweep generator output attenuators for a 1.0 volt peak-to-peak response curve. Any further adjustments to maintain the 1.0 volt peak-to-peak response as the alignment proceeds must be done by adjusting the IF GAIN control on the IFD-500B.

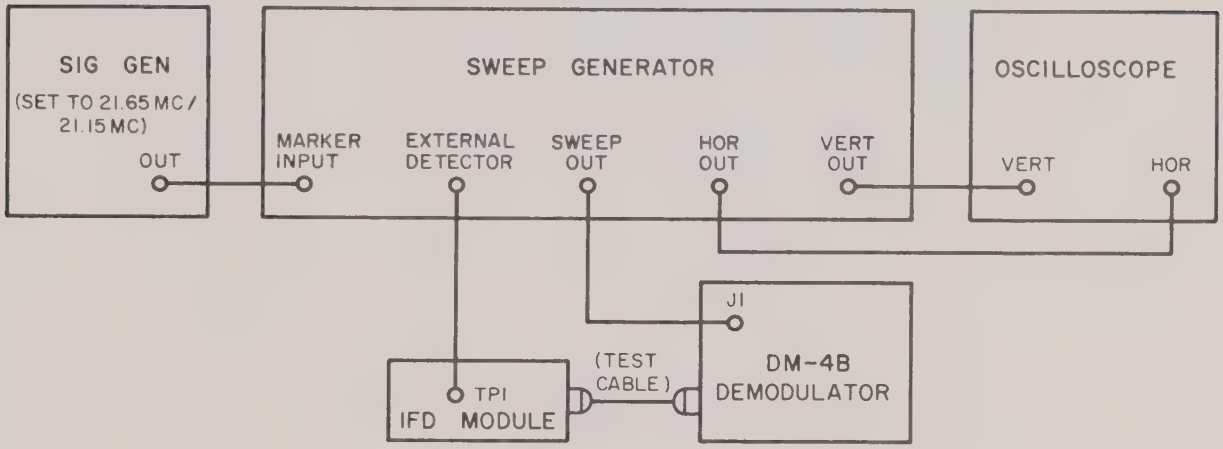

Figure 4-2. Equipment Setup, IF Alignment

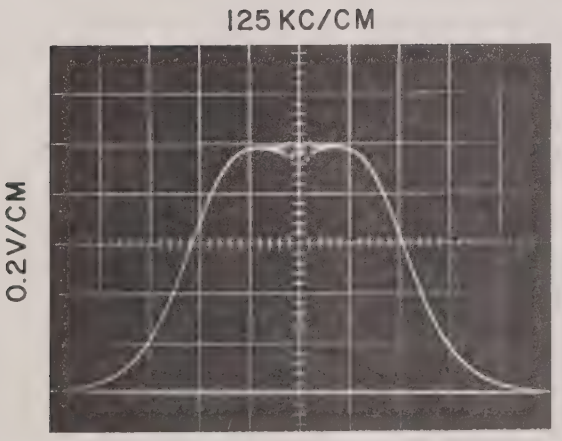

Figure 4-3. Typical Response Curve, IF Alignment

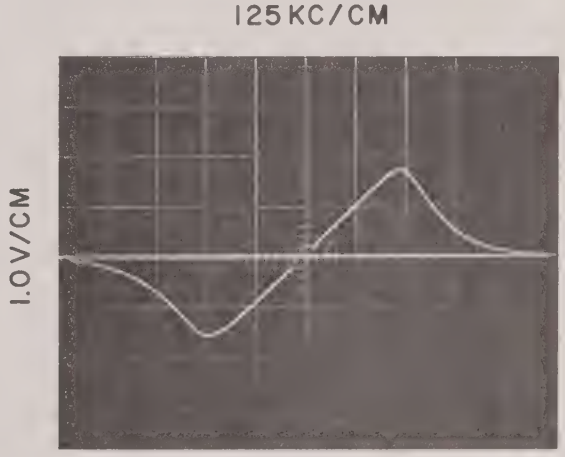

Figure 4-4. Typical Response Curve, Discriminator Alignment

(5) Adjust L2, L3, L5, L6, and L8 for a response curve centered about the 21.4-mc marker similar to Figure 4-3. Use the signal generator as a marker to check for 3-db response at 21.15 mc and 21.65 mc.

4.4.3 Discriminator Alignment. - Proceed as follows:

(1) Equipment setup remains the same as Figure 4-2 except that the sweep generator marker adder input is now connected to TP4, FM DET.
(2) Adjust the sweep generator and oscilloscope to display an "S" response curve.

(3) Adjust T1 and L3 for zero crossing at the 21.4-mc marker, and for maximum linearity between 21.65 mc and 21.15 mc. Use the signal generator as a marker to determine the linearity limits. A typical response is shown in Figure 4-4.

4.4.4 BFO Alignment. - Proceed as follows:

(1) Calibrate the signal generator for a 21.400 ±.002 mc output using the frequency counter. Set the output level for 250 μv.
(2) Connect the equipment as shown in Figure 4-1.
(3) Set the IFD-500B mode selector to BFO and the BFO tuning control on the DM-4B to midrange.
(4) Adjust L11 and L12 for maximum dc voltage at TP1.
(5) Remove the bottom cover of the IFD-500B and adjust L10 for a zero-beat indication on the oscilloscope.

Table 4-1. Type IFD-500B IF Demodulator, Transistor Element Voltages

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
Q1	2N2708	2.2	1.6	9.6
Q2	2N2708	2.2	2.8	10.2
Q3	2N2708	2.0	2.75	11.4
Q4*	2N706	2.6	2.65	8.2
Q5*	2N706	1.78	2.5	10.0
A1Q1	2N697	6.8	7.2	11.5
A1Q2	2N706	7.4	8.3	11.5
A1Q3	2N3251	7.2	6.8	-11.5
A2Q1	2N697	6.8	7.2	11.5
A2Q2	2N706	7.4	8.3	11.5
A2Q3	2N3251	7.2	6.8	-11.5
A3Q1	2N697	6.8	7.2	11.5
A3Q2	2N706	7.4	8.3	11.5
A3Q3	2N3251	7.2	6.8	-11.5
A4Q1	2N697	0.1	0.0	10.8
A4Q2	2N697	10.2	10.8	11.5
A5Q1	2N706	2.55	3.2	10.9
A5Q2	2N706	2.55	3.2	10.9
A5Q3	2N706	2.6	3.3	11.0
A5Q4	2N706	2.6	3.3	11.0

Test Conditions: All voltages are positive dc with respect to chassis unless otherwise noted. The DM-4B was used as the power source; 115 vac was applied to the DM-4B. Readings taken with an RCA WV-98B VTVM. Control settings as follows: MODE SEL in AM; AGC SEL in NORM; GAIN SET at max. cw; IF GAIN at max. cw; VIDEO BANDWIDTH at 250 KC. No input signal applied.

Note: *MODE SEL in BFO.

Table 4-2. Type IFD-500B IF Demodulator, Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	REMEDY
No input.	a. Input shorted to ground.	a. Turn POWER off and check jack J1 to ground.
No input to base of Q1.	a. C49 defective. b. R1 shorted.	a. Check coupling capacitor C49 and R1. Replace as necessary.
Stage Q1 is unstable.	a. Neutralization network defective.	a. Check C2 for open circuit.
No B-plus on the collector of Q1.	a. Open between source and collector of Q1.	a. Check L1 and R4 for open and replace.
No output from Q1.	a. Defective transistor.	a. Check Q1 and replace if necessary.
No input to the base of Q2.	a. C7, C8, C9, or L3 defective.	a. Check C7, C8, C9 for open and replace if necessary. Also check L3 for open or mistuning.
Q2 is unstable.	a. No neutralization applied to the base of Q2.	a. Replace C11 if found open.
L5 is tunable but L6 is not.	a. Open ground connection.	a. Check the ground connection at end of L6 and resolder.
No output from Q3.	a. Defective transistor.	a. Check Q3 and replace if necessary.
No signal to the AM detector CR1.	a. Defective coupling capacitor.	a. Check C23 for open circuit.
Input to CR1 but no output.	a. Defective diode.	a. Replace CR1.
No video output signal at TP3.	a. Video amplifier, A3, defective.	a. Check A3Q1, A3Q2, A3Q3, A3CR1 and A3CR2 for open or short circuit. Replace if necessary.
No input to A4Q1.	a. Defective transistor in video amplifier, A1, or open circuit between A1Q3 and A4Q1.	a. Check the A1 video amplifier, for defective transistor or diode. Replace if necessary. Also, run a continuity check between amplifiers to determine whether an open circuit exists.

Table 4-2. Type IFD-500B IF Demodulator, Troubleshooting Chart - (Cont'd.)

SYMPTOM	PROBABLE CAUSE	REMEDY
No output from AGC amplifier.	a. A4Q1 or A4Q2 defective.	a. Check these transistors and replace if necessary.
No BFO input to AM detector.	a. Open coupling capacitor, or diode short circuited.	a. Check C40 for open and replace if necessary. Check CR3 for short.
No BFO output.	a. Defective transistor. b. Defective switch.	a. Check Q4 and Q5. b. Check S1B and R35.
The BFO frequency is not adjustable.	a. CR2 or L10 or both are defective.	a. Check these components and replace if necessary.
No signal to the base of A5Q1.	a. Defective capacitor.	a. Check C24, C25, and C28 for open and replace if necessary.
No clipping of input signal.	a. Transistor in limiting circuit defective.	a. Check A5Q1 through A5Q4 for defective transistor and replace as necessary.
No input to discriminator.	a. Open winding in transformer.	a. Check A5L3 and A5T1.
Rectification not occuring in discriminator.	a. Defective diode.	a. Check A5CR4 and A5CR5 for open circuit.
Output from discriminator is good but no signal to video amplifier, A2.	a. Defective choke or resistor.	a. Check A5L4 and A5R18 for open circuit. Replace if necessary.
No output from A2.	a. Defective diode or transistor.	a. Check A2Q1, A2Q2, A2Q3, A2CR1 and A2CR2 for defective component and replace as necessary.
No output from A3.	a. Defective diode or transistor.	a. Check A3Q1, A3Q2, A3Q3, A3CR1, and A3CR2 for defective component and replace as necessary.

SECTION V

REPLACEMENT PARTS LIST

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules), and parts. An example of the unit method follows:

Read from right to left as: First (1) resistor (R) of first (1) subassembly (A)

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are provided on drawings and illustrations following the notation "REF DESIG PREFIX".

5.3 LIST OF MANUFACTURERS

Vendor Code	Name and Address	Vendor Code	Name and Address
01121	Allen-Bradley Company 136 West Greenfield Avenue Milwaukee, Wisconsin	07910	Continental Device Corporation 12515 Chadion Avenue Hawthorne, California
01281	TRW Semiconductors, Inc. 14520 Aviation Boulevard Lawndale, California	14632	Communication Electronics, Inc. 6006 Executive Boulevard Rockville, Maryland
01295	Texas Instruments, Inc. 6000 Lemmon Avenue Dallas, Texas	37942	P. R. Mallory and Company 3031 E. Washington Street Indianapolis, Indiana
02114	Ferroxcube Corporation of America 149 E. Bridge Street Saugerties, New York	56289	Sprague Electric Company 481 Marshall Street North Adams, Massachusetts
02735	Radio Corporation of America 415 South Fifth Street Harrison, New Jersey	71450	CTS Corporation 1142 West Beardsley Avenue Elkhart, Indiana
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey	71468	Cannon Electric Company 3208 Humboldt Street Los Angeles, California
04713	Motorola Semiconductor Products 5005 East McDowell Road Phoenix, Arizona	71590	Centralab, Div. of Globe Union 932 East Keefe Avenue Milwaukee, Wisconsin

Vendor Code	Name and Address	Vendor Code	Name and Address
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania	91418	Radio Materials Corporation 4242 West Bryn Mawr Avenue Chicago, Illinois
74868	Amphenol RF Division 33 East Franklin Street Danbury, Connecticut	93332	Sylvania Electric Products, Inc. Semiconductor Products Division Woburn, Massachusetts
76854	Oak Manufacturing Company Crystal Lake Illinois	95121	Quality Components, Inc. P. O. Box 113 St. Mary's, Pennsylvania
84171	Arco Electronics, Inc. 100 Community Drive Great Neck, New York	99848	Wilco Corporation 4030 W. 10th Street Indianapolis, Indiana

5.4 PARTS LIST

When ordering replacement parts from CEI, specify the type and serial number of the equipment, and the reference designation and description of each part ordered. The Vendors and Vendor Part Numbers listed are included as a guide to the user of the equipment in the field and do not necessarily agree with the parts installed in the equipment. Except in those cases specifically noted, the replacement part may be obtained from any vendor as long as the physical and electrical parameters of the part selected agree with the original part.

NOTE

As improved semiconductors become available it is the policy of CEI to incorporate them in proprietary products. For this reason some transistors and diodes installed in an equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

5.4.1 Main Chassis

Ref. Desig.	Description	Vendor Part No.	Vendor Code
A1	VIDEO AMPLIFIER	10949-1	14632
A2	Same as A1		
A3	Same as A1		
A4	AGC AMPLIFIER	10383-1	14632
A5	FM LIMITER/DEMODULATOR	10447	14632
C1	CAPACITOR, CERAMIC DISC: .005 μf, 20%	SM (.005 μf, 20%)	91418
C2	CAPACITOR, CERAMIC TUBULAR: 1.2 pf, ±.25 pf	301-000-COKO-129C	72982
C3	CAPACITOR, CERAMIC DISC: 1000 pf, GMV	SM (1000 pf, GMV)	91418
C4	CAPACITOR, DIPPED MICA: 47 pf, 5%	DM10-470J	84171
C5	Same as C4		
C6	CAPACITOR, CERAMIC PLATE: .01 μf, 20%, 200V	4835-000-Z5U0-103M	72982
C7	Same as C2		
C8	CAPACITOR, DIPPED MICA: 24 pf, 5%	DM10-240J	84171
C9	CAPACITOR, DIPPED MICA: 360 pf, 5%	DM15-361J	84171
C10	Same as C3		
C11	CAPACITOR, COMPOSITION TUBULAR: .33 pf, 10%	QC (.33 pf, 10%)	95121
C12	CAPACITOR, DIPPED MICA: 100 pf, 5%	DM10-101J	84171
C13	CAPACITOR, DIPPED MICA: 33 pf, 5%	DM10-330J	84171
C14	Same as C6		
C15	CAPACITOR, CERAMIC TUBULAR: 3.0 pf, ±.25 pf	301-000-COJO-309C	72982
C16	Same as C8		
C17	CAPACITOR, DIPPED MICA: 200 pf, 5%	DM10-201J	84171
C18	Same as C1		
C19	CAPACITOR, COMPOSITION TUBULAR: .68 pf, 10%	QC (.68 pF, 10%)	95121
C20	Same as C4		
C21	Same as C4		
C22	Same as C6		
C23	CAPACITOR, CERAMIC TUBULAR: 2.4 pf, ±.25 pf	301-000-COJO-249C	72982
C24	Same as C13		
C25	Same as C4		
C26	CAPACITOR, CERAMIC TUBULAR: 4.7 pf, ±.25 pf	301-000-COHO-479C	72982
C27	Same as C3		
C28	CAPACITOR, DIPPED MICA: 560 pf, 5%	DM15-561J	84171
C29	CAPACITOR, CERAMIC FEEDTHRU: 1000 pf, GMV	FA5C-102W	01121
C30	CAPACITOR, CERAMIC TUBULAR: 10 pf, ±.5 pf (TC Type N750)	301-000-U2J0-100D	72982

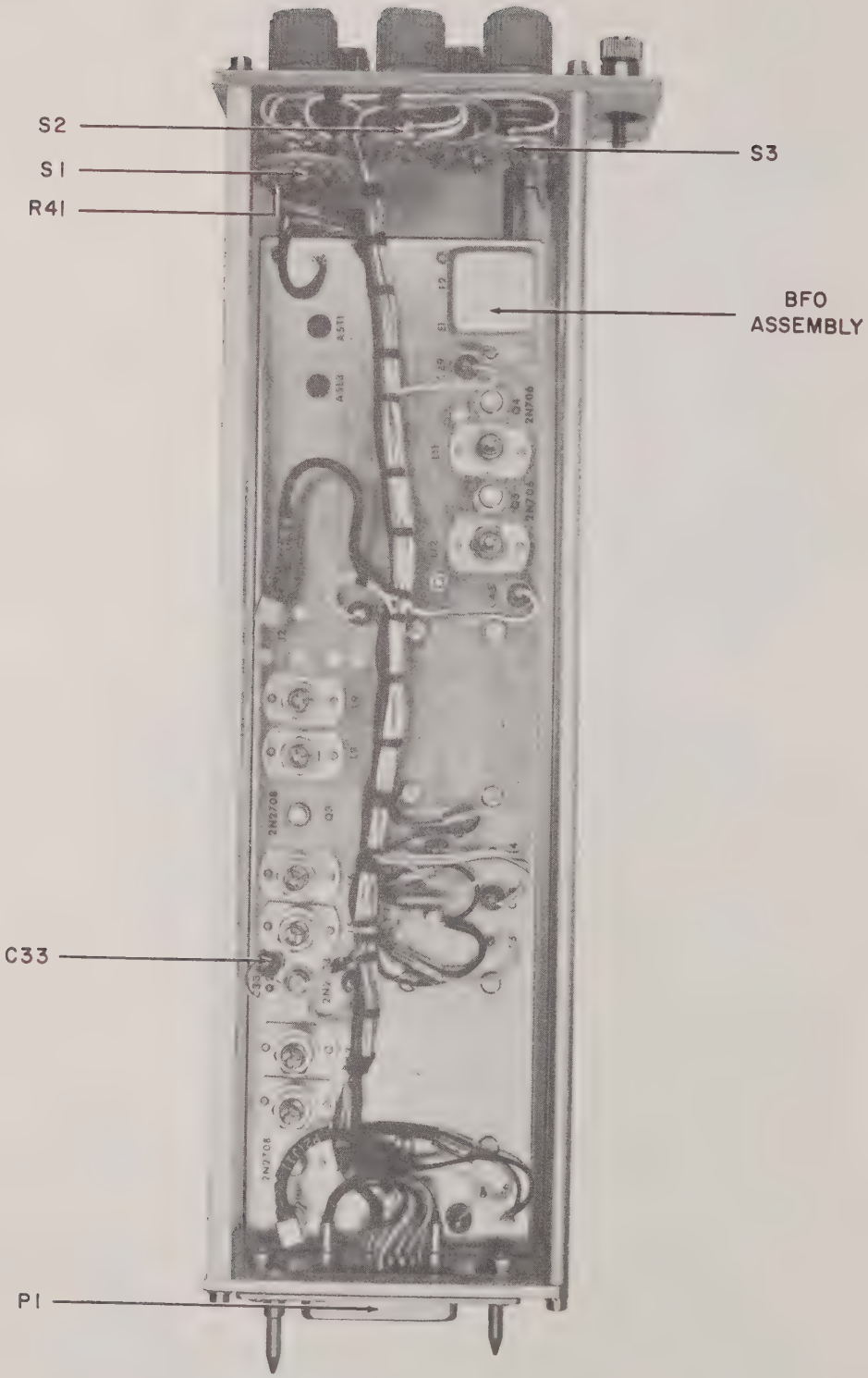

Figure 5-1. Type IFD-500B IF Demodulator, Left-Side View

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C31	CAPACITOR, DIPPED MICA: 43 pf, 5%	DM10-430J	84171
C32	Same as C4		
C33	Same as C29		
C34	CAPACITOR, DIPPED MICA: 180 pf, 5%	DM10-181J	84171
C35	CAPACITOR, DIPPED MICA: 160 pf, 5%	DM10-161J	84171
C36	Same as C12		
C37	CAPACITOR, DIPPED MICA: 910 pf, 5%	DM15-911J	84171
C38	Same as C6		
C39	CAPACITOR, DIPPED MICA: 51 pf, 5%	DM10-510J	84171
C40	CAPACITOR, CERAMIC TUBULAR: 2.2 pf, ±.25 pf	301-000-COJO-229C	72982
C41	Same as C6		
C42	Same as C29		
C43	Same as C29		
C44	Same as C29		
C45	Same as C29		
C46	CAPACITOR, ELECTROLYTIC: 47 μf, 20%, 6V	150D476X0006B2	56289
C47	Same as C29		
C48	Same as C29		
C49	Same as C3		
C50	CAPACITOR, CERAMIC DISC: 470 pf, 20%, 1000V	B (470 pF, 20%)	91418
C51	Same as C50		
C52	CAPACITOR, DIPPED MICA: 10 pf, 5%	DM10-100J	84171
C53	CAPACITOR, CERAMIC DISC: 1500 pf, 10%	ID-152	71590
C54	CAPACITOR, ELECTROLYTIC: 1.5 μf, 20%, 35V	150D155X0035B2	56289
C55	Same as C3		
CR1	DIODE	1N198	93332
CR2	DIODE, CAPACITOR	V27E	01281
CR3	DIODE	1N462A	07910
CR4	NOT USED		
CR5	NOT USED		
E1	FEEDTHRU, TEFLON	SFU-16	04013
E2	Same as E1		
E3	Same as E1		
E4	Same as E1		
E5	Same as E1		
E6	Same as E1		

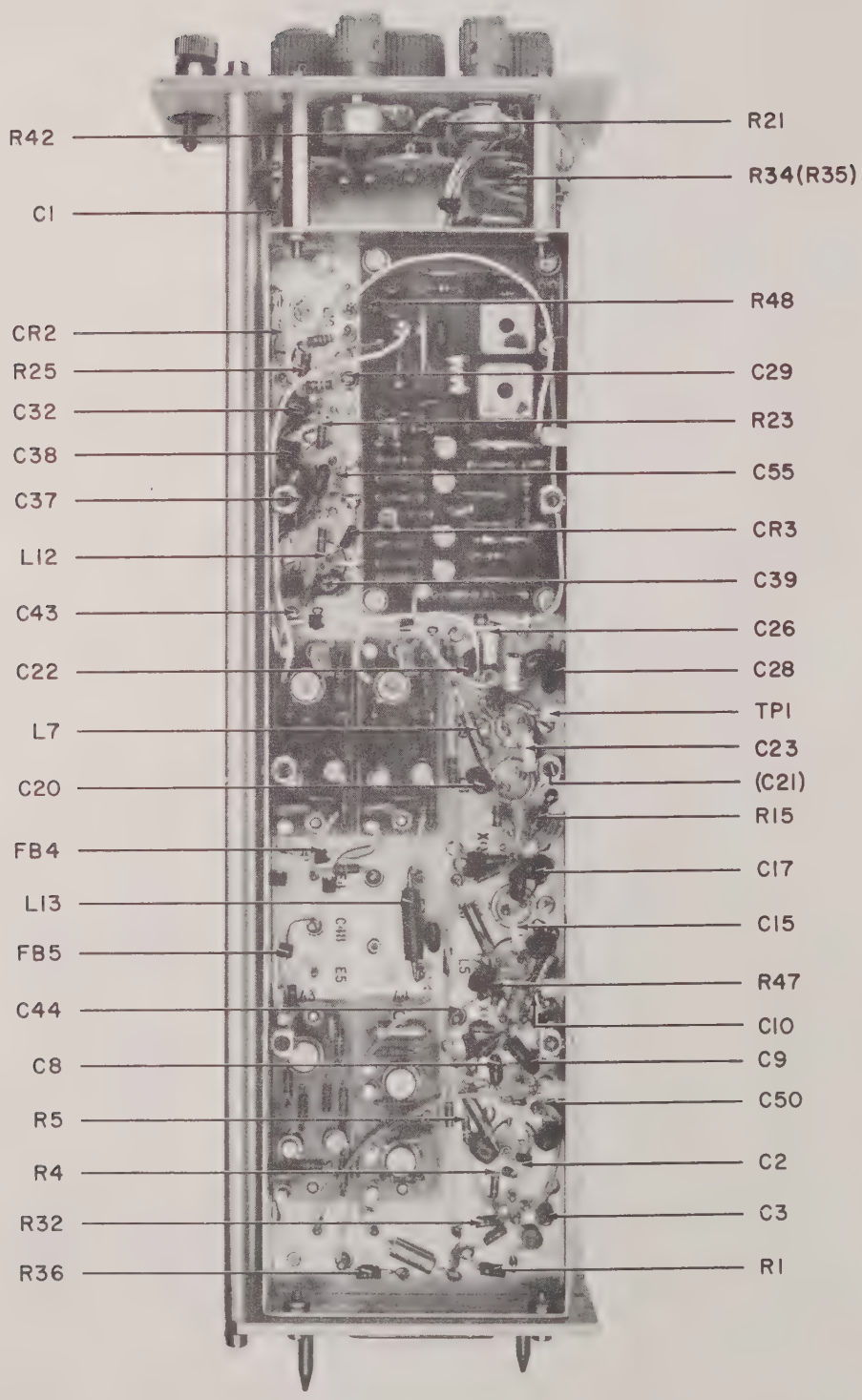

Figure 5-2. Type IFD-500B IF Demodulator, Right-Side View

Ref. Desig.	Description	Vendor Part No.	Vendor Code
FB1	FERRITE BEAD	56-590-65/4A	02114
FB2	Same as FB1		
FB3	Same as FB1		
FB4	Same as FB1		
FB5	Same as FB1		
FB6	Same as FB1		
J1	CONNECTOR, RECEPTACLE, SUB-MINIATURE	27-9	74868
J2	Same as J1		
L1	COIL, FIXED	1131-37	14632
L2	COIL, VARIABLE	1472-3	14632
L3	Same as L2		
L4	Same as L1		
L5	Same as L2		
L6	Same as L2		
L7	Same as L1		
L8	Same as L2		
L9	Same as L2		
L10	COIL, VARIABLE	1113	14632
L11	COIL, VARIABLE	1472-1	14632
L12	COIL, VARIABLE	1472-1	14632
L13	COIL, FIXED: 5.6 μh	214-11	99848
P1	CONNECTOR, PLUG, MULTIPIN, w/2 coaxial inserts #DM53740-5001, p/o W1 and W2	DBM-17W-2P	71468
P2	CONNECTOR, PLUG, SUB-MINIATURE, p/o W1	27-26	74868
P3	Same as P2, p/o W2		
Q1	TRANSISTOR	2N2708	02735
Q2	Same as Q1		
Q3	Same as Q1		
Q4	TRANSISTOR	2N706	01295
Q5	Same as Q4		
R1	RESISTOR, FIXED, COMPOSITION: 51Ω, 5%, 1/4W	CB5105	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1K, 5%, 1/4W	CB5125	01121
R3	RESISTOR, FIXED, COMPOSITION: 1K, 5%, 1/4W	CB1025	01121
R4	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	CB4705	01121
R5	RESISTOR, FIXED, COMPOSITION: 130K, 5%, 1/4W	CB1345	01121
R6	Same as R2		
R7	RESISTOR, FIXED, COMPOSITION: 15K, 5%, 1/4W	CB1535	01121
R8	Same as R3		

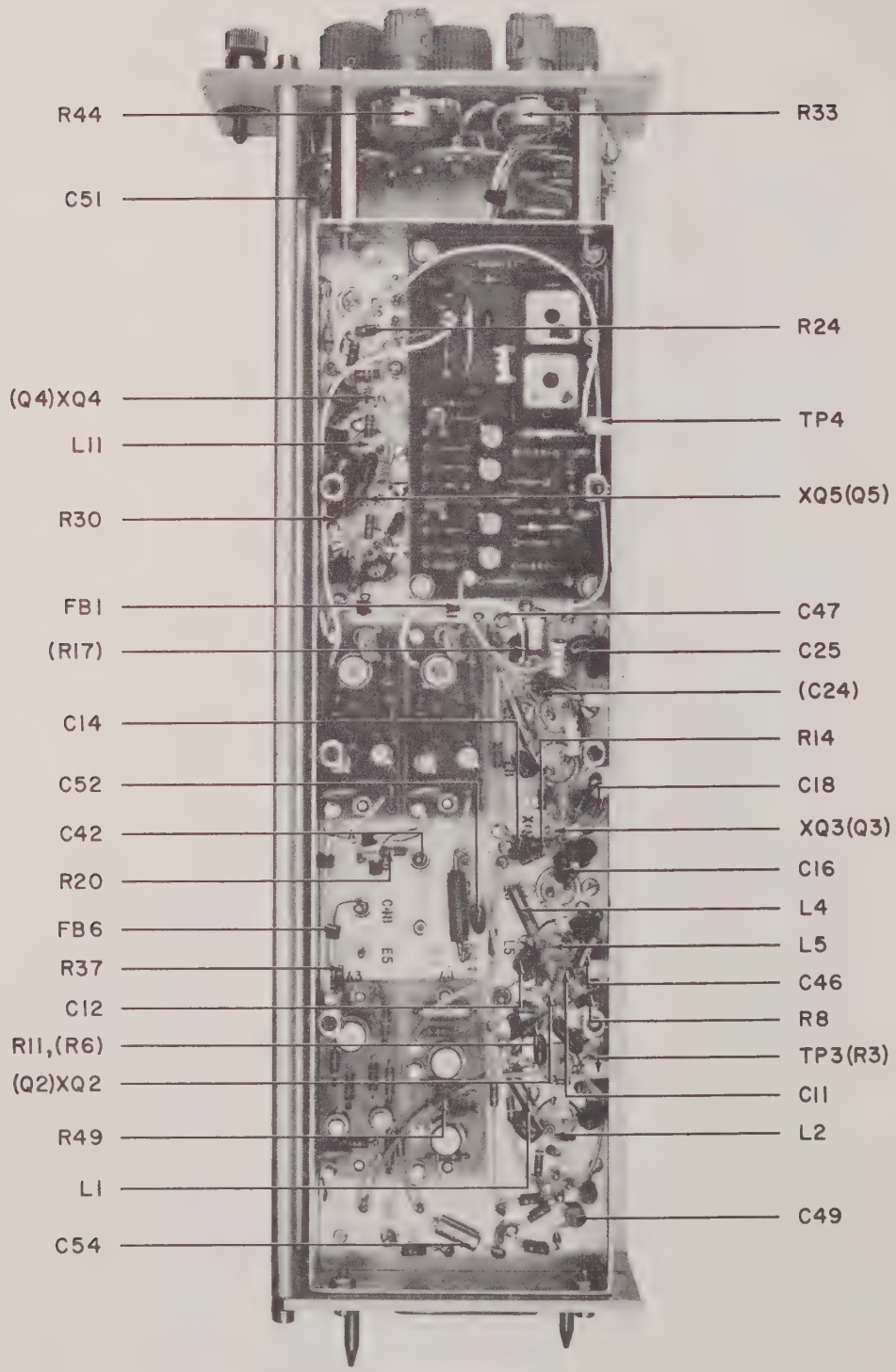

Figure 5-3. Type IFD-500B IF Demodulator, Right-Side View

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R9	RESISTOR, FIXED, COMPOSITION: 240Ω, 5%, 1/4W	CB2415	01121
R10	Same as R4		
R11	Same as R5		
R12	RESISTOR, FIXED, COMPOSITION: 3K, 5%, 1/4W	CB3025	01121
R13	Same as R2		
R14	RESISTOR, FIXED, COMPOSITION: 12K, 5%, 1/4W	CB1235	01121
R15	RESISTOR, FIXED, COMPOSITION: 470Ω, 5%, 1/4W	CB4715	01121
R16	Same as R4		
R17	RESISTOR, FIXED, COMPOSITION: 47K, 5%, 1/4W	CB4735	01121
R18	Same as R9		
R19	Same as R4		
R20	RESISTOR, FIXED, COMPOSITION: 27K, 5%, 1/4W	CB2735	01121
R21	RESISTOR, FIXED, COMPOSITION: 560Ω, 5%, 1/4W	CB5615	01121
R22	RESISTOR, FIXED, COMPOSITION: 240K, 5%, 1/4W	CB2445	01121
R23	RESISTOR, FIXED, COMPOSITION: 43K, 5%, 1/4W	CB4335	01121
R24	Same as R23		
R25	RESISTOR, FIXED, COMPOSITION: 33Ω, 5%, 1/4W	CB3305	01121
R26	RESISTOR, FIXED, COMPOSITION: 2.2K, 5%, 1/4W	CB2225	01121
R27	Same as R3		
R28	Same as R14		
R29	Same as R2		
R30	Same as R3		
R31	Same as R15		
R32	Same as R14		
R33	RESISTOR, VARIABLE, COMPOSITION: 1K, 10%, 1/4W	70-08800	37942
R34	Same as R3		
R35	Same as R14		
R36	RESISTOR, FIXED, COMPOSITION: 20K, 5%, 1/4W	CB2035	01121
R37	Same as R3		
R38	NOT USED		
R39	NOT USED		
R40	RESISTOR, FIXED, COMPOSITION: 1.8K, 5%, 1/4W	CB1825	01121
R41	RESISTOR, FIXED, COMPOSITION: 2.7K, 5%, 1/4W	CB2725	01121
R42	Same as R3		
R43	RESISTOR, FIXED, COMPOSITION: 2.4K, 5%, 1/4W	CB2425	01121
R44	RESISTOR, VARIABLE, COMPOSITION: 10K, 10%, 1/2W	LW23562	71450

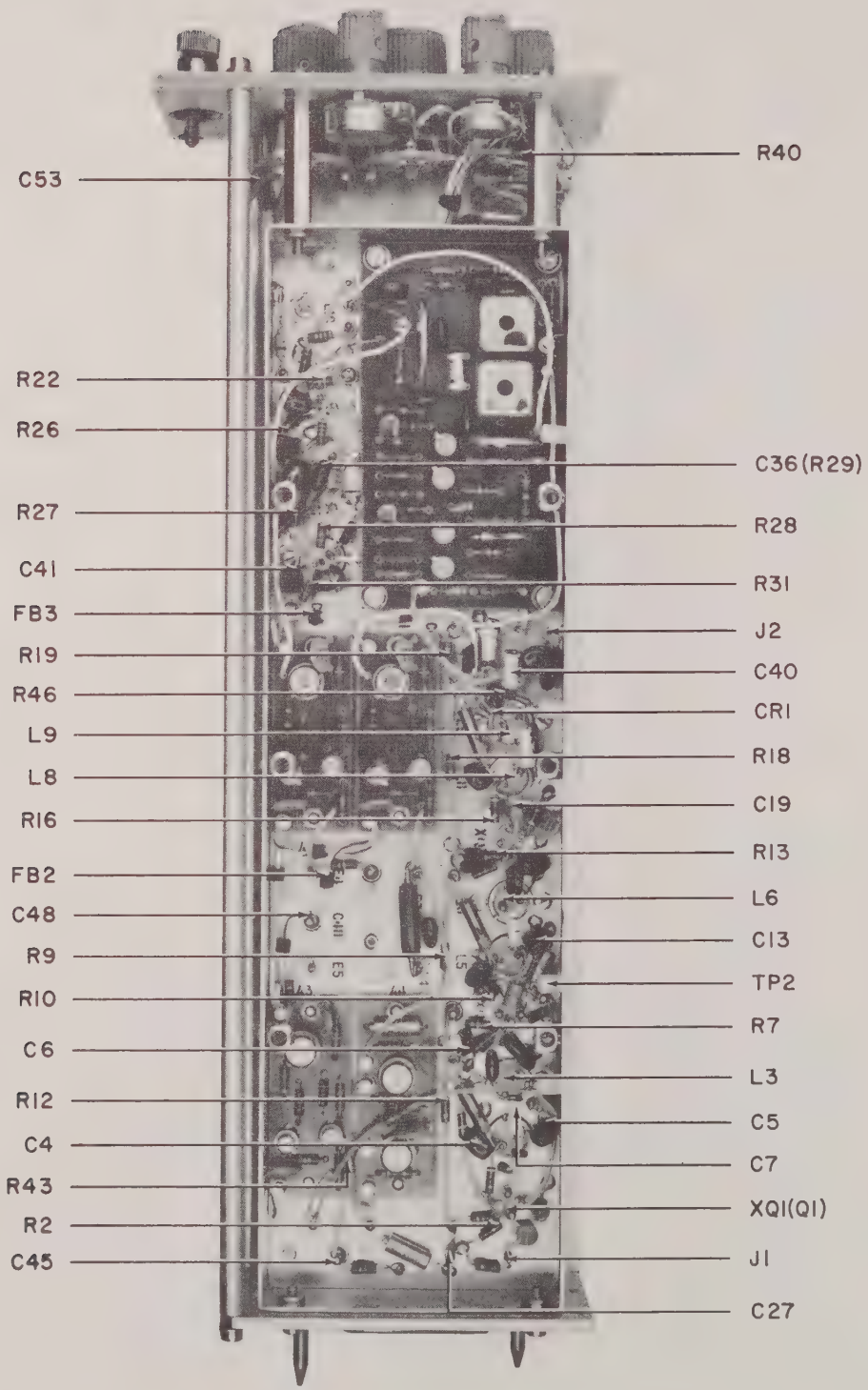

Figure 5-4. Type IFD-500B IF Demodulator, Right-Side View

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R45	NOT USED		
R46	RESISTOR, FIXED, COMPOSITION: 10K, 5%, 1/4W	CB1035	01121
R47	Same as R46		
R48	Same as R46		
R49	Same as R46		
S1	SWITCH, ROTARY: 2 section, 4 pole, 2-6 position	1128-29	81716
S2	SWITCH, ROTARY: 1 section, 2 pole, 2-6 position	1128-31	81716
S3	Same as S2		
TP1	TIP JACK	TJ6	04013
TP2	Same as TP1		
TP3	Same as TP1		
TP4	Same as TP1		
W1	CABLE AND CONNECTOR ASSEMBLY	30020-118	14632
W2	CABLE AND CONNECTOR ASSEMBLY	30020-119	14632

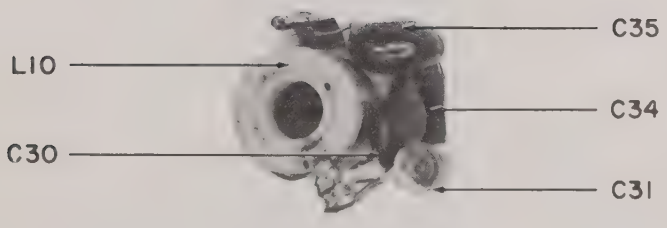

Figure 5-5. BFO Assembly, Component Locations

5.4.2 Type 10949 Video Amplifier REF DESIG PREFIXES A1, A2 AND A3

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC DISC: .005 μf, 20%	SM (.005 μF, 20%)	91418
C2	Same as C1		
CR1	DIODE	1N462A	07910
CR2	Same as CR1		
Q1	TRANSISTOR	2N697	01295
Q2	TRANSISTOR	2N706	01295
Q3	TRANSISTOR	2N3251	04713
R1	RESISTOR, FIXED, COMPOSITION: 510K, 5%, 1/4W	CB5145	01121
R2	RESISTOR, FIXED, COMPOSITION: 3K, 5%, 1/4W	CB3025	01121
R3	RESISTOR, FIXED, COMPOSITION: 6.2K, 5%, 1/4W	CB6225	01121
R4	RESISTOR, FIXED, COMPOSITION: 6.8Ω, 5%, 1/4W	CB68G5	01121
R5	Same as R4		

REF DESIG PREFIX A1, A2, & A3

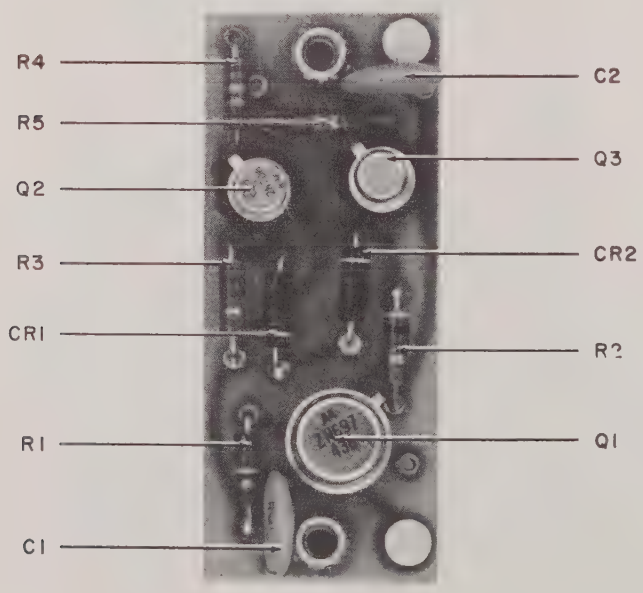

Figure 5-6. Part 10949 Video Amplifier, Component Locations

5.4.3 Type 10383 AGC Amplifier REF DESIG PREFIX A4

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC: 3.3 μf, 10%, 35V	150D335X9035B2	56289
C2	CAPACITOR, CERAMIC DISC: .005 μf, 20%	SM (.005 μF, 20%)	91418
Q1	TRANSISTOR	2N697	01295
Q2	Same as Q1		
R1	RESISTOR, FIXED, COMPOSITION: 30K, 5%, 1/4W	CB3035	01121
R2	RESISTOR, FIXED, COMPOSITION: 33K, 5%, 1/4W	CB3335	01121
R3	RESISTOR, FIXED, COMPOSITION: 470Ω, 5%, 1/4W	CB4715	01121
R4	RESISTOR, FIXED, COMPOSITION: 18K, 5%, 1/4W	CB1835	01121
R5	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	CB4705	01121

REF DESIG PREFIX A4

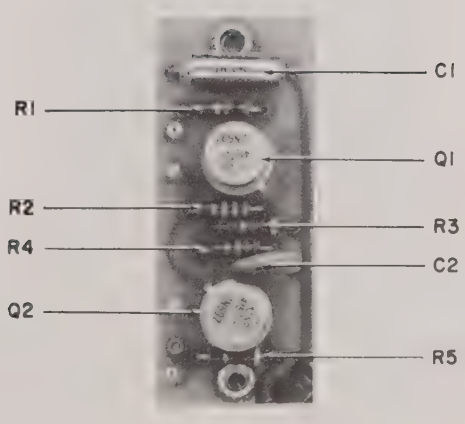

Figure 5-7. Part 10383 AGC Amplifier, Component Locations

5.4.4 Type 10447 FM Demodulator REF DESIG PREFIX A5

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC DISC: 1000 pf, GMV	SM (1000 pF, GMV)	91418
C2	Same as C1		
C3	Same as C1		
C4	Same as C1		
C5	CAPACITOR, DIPPED MICA: 24 pf, 5%	DM10-240J	84171
C6	CAPACITOR, DIPPED MICA: 33 pf, 5%	DM10-330J	84171
C7	CAPACITOR, DIPPED MICA: 10 pf, 5%	DM10-100J	84171
C8	CAPACITOR, CERAMIC TUBULAR: 5.6 pf, ±.5 pf	301-000-COHO-569D	72982
C9	Same as C1		
C10	CAPACITOR, DIPPED MICA: 91 pf, 5%	DM10-910J	84171
C11	Same as C10		
C12	Same as C6		
CR1	DIODE	1N198	93332
CR2	DIODE, ZENER	1N753A	04713
CR3	Same as CR1		
CR4	Same as CR1		
CR5	Same as CR1		
L1	COIL, FIXED	1131-41	14632
L2	COIL, FIXED	1131-37	14632
L3	COIL, VARIABLE	3476-13	14632
L4	Same as L2		
Q1	TRANSISTOR	2N706	01295
Q2	Same as Q1		
Q3	Same as Q1		
Q4	Same as Q1		
R1	RESISTOR, FIXED, COMPOSITION: 5.1K, 5%, 1/4W	CB5125	01121
R2	RESISTOR, FIXED, COMPOSITION: 12K, 5%, 1/4W	CB1235	01121
R3	RESISTOR, FIXED, COMPOSITION: 1K, 5%, 1/4W	CB1025	01121
R4	Same as R1		
R5	Same as R1		
R6	Same as R2		
R7	RESISTOR, FIXED, COMPOSITION: 22Ω, 5%, 1/4W	CB2205	01121
R8	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	CB4705	01121
R9	Same as R2		
R10	Same as R1		

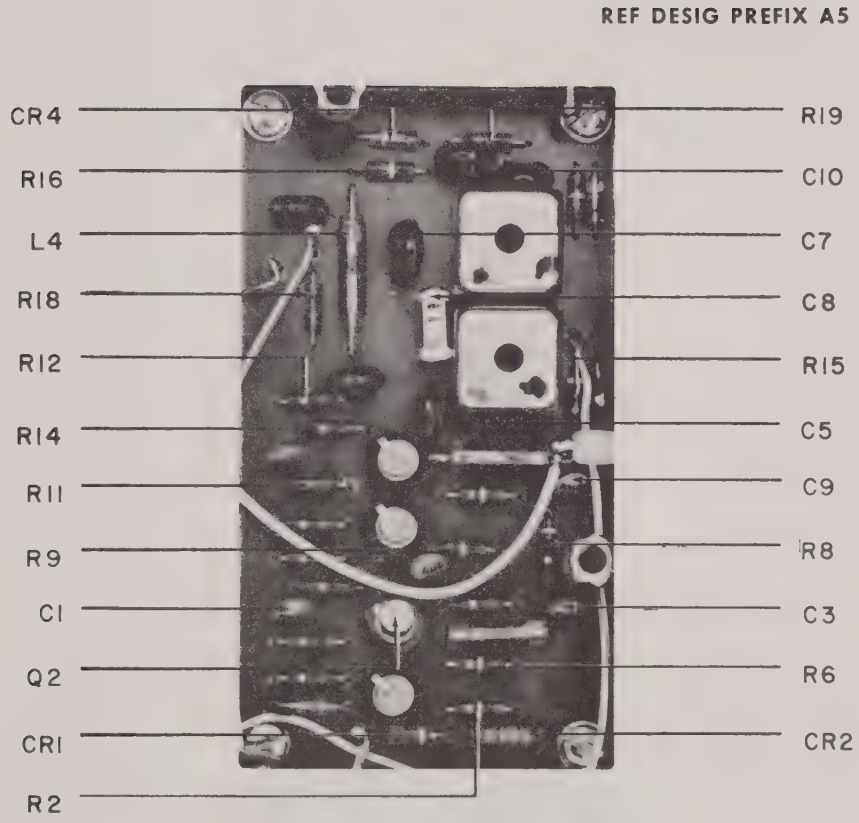

Figure 5-8. Part 10447 FM Demodulator, Component Locations

Ref. Desig.		Vendor Part No.	Vendor Code
R11	RESISTOR, COMPOSITION: 680 ohm 5%, 1/4W	CB6815	01121
R12	Same as R1		
R13	Same as R2		
R14	Same as R7		
R15	Same as R8		
R16	RESISTOR, COMPOSITION: 100 K 5%, 1/4W	CB1045	01121
R17	Same as R16		
R18	Same as R3		
R19	RESISTOR, COMPOSITION: 15 K 5%, 1/4W	CB1535	01121
T1	TRANSFORMER	3476-17	14632

REF DESIG PREFIX A5

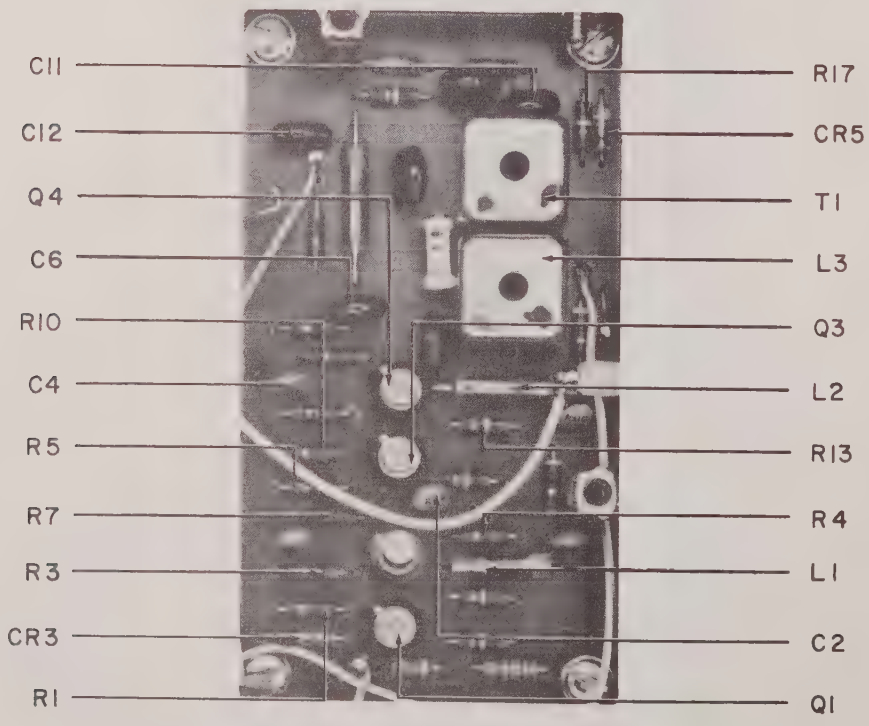

Figure 5-9. Part 10447 FM Demodulator, Component Locations

SECTION VI
SCHEMATIC DIAGRAMS

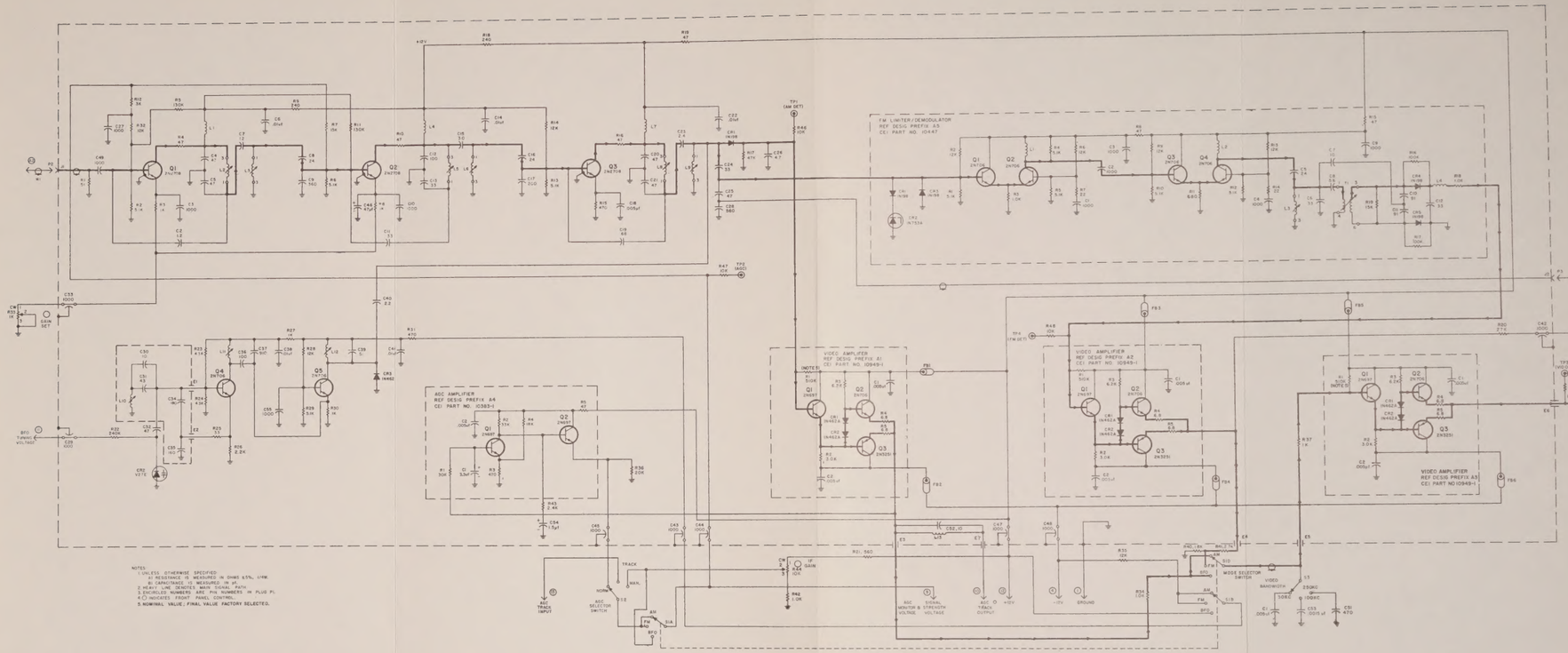

Figure 6-1. Type IFD-500B IF Demodulator, Schematic Diagram